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APPENDIX B: WASTE MANAGEMENT

The U.S. Department of Energy (DOE) established its *National Environmental Policy Act* (NEPA) implementing procedures (10 *Code of Federal Regulations* [CFR] §1021.330) that allow preparation of site-wide documents for certain large, multiple-facility sites, such as the Lawrence Livermore National Laboratory (LLNL). Pursuant to the NEPA of 1969 (42 United States Code [U.S.C.] §4321 et seq.), the Council on Environmental Quality's (CEQ's) NEPA regulations (40 CFR Parts 1500-1508), and DOE NEPA implementing procedures (10 CFR Part 1021), the National Nuclear Security Administration (NNSA) decided to complete this appendix as part of this *Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement* (LLNL SW/SPEIS).

The format was modified in consideration of the California Department of Toxic Substances Control (DTSC) request for information to complete a initial study for LLNL permit modifications in accordance with the *California Environmental Quality Act* of 1970 (CEQA) (*California Public Resources Code* §21000 et seq.) and implementing guidelines (*California Code of Regulations* §15000 et seq.). The objective of this appendix is to provide NNSA, other agencies, and the public with:

- An analysis of the potential environmental impacts caused by ongoing and reasonably foreseeable new operations and facilities and reasonable alternatives at LLNL
- A basis for site-wide decisionmaking
- Improved coordination of agency plans, functions, programs, and resource utilization
- A clearer understanding of the impacts created by LLNL permit modifications and LLNL waste management operations separate from overall LLNL operations
- Sufficient information to facilitate routine decisions by NNSA regarding verification of operational status
- Sufficient information to facilitate permit modification decisions by the DTSC

This appendix will enable NNSA to “tier” its NEPA documentation, eliminate repetitive discussion of the same issues in future NEPA reviews, and focus on the actual issues ready for decisions at each level of environmental review.

In December 2002, NNSA identified the need to update waste management benchmark information and impact analysis to support the current LLNL waste management site planning. To meet this need, NNSA decided to prepare this appendix and provide project-specific information in one report.

This appendix includes a comprehensive review of the practices of onsite waste handling, packaging, and treatment; treatment and storage units; and estimates of waste generation types. Unless otherwise specified, the appendix analyzes the Livermore Site and Site 300 collectively to bound potential impacts, and the term “permitted” refers to the *Resource Conservation and Recovery Act* (RCRA) hazardous waste permit from the State of California. Similarly,

radioactive and hazardous waste management (RHWM) facilities are considered collectively, including pertinent facilities managed by Plant Engineering and the Chemistry and Material Science Directorate. This review of the Proposed Action, No Action Alternative, and Reduced Operation Alternative includes a series of permit modifications, consolidation of existing capabilities, equipment transfers, increased utilization of the Decontamination and Waste Treatment Facility (DWTF), and several RCRA closures.

Section B.1 introduces waste categories, waste management practices, and waste management facilities, both hazardous and radioactive, at LLNL. Section B.2 presents the agency purpose and need. Descriptions of the alternatives are presented in Section B.3. Section B.4 provides a description of the affected environment, including historical and current waste generation and waste management activities. Section B.5 presents the environmental consequences. This appendix concludes with a summary on levels of significance for each resource area and a brief discussion on CEQA impacts (Section B.6).

Figure B–1 illustrates how major program and facility information, related studies, and historical information flow into the waste management appendix. Additionally, this appendix supports other sections of the LLNL SW/SPEIS.

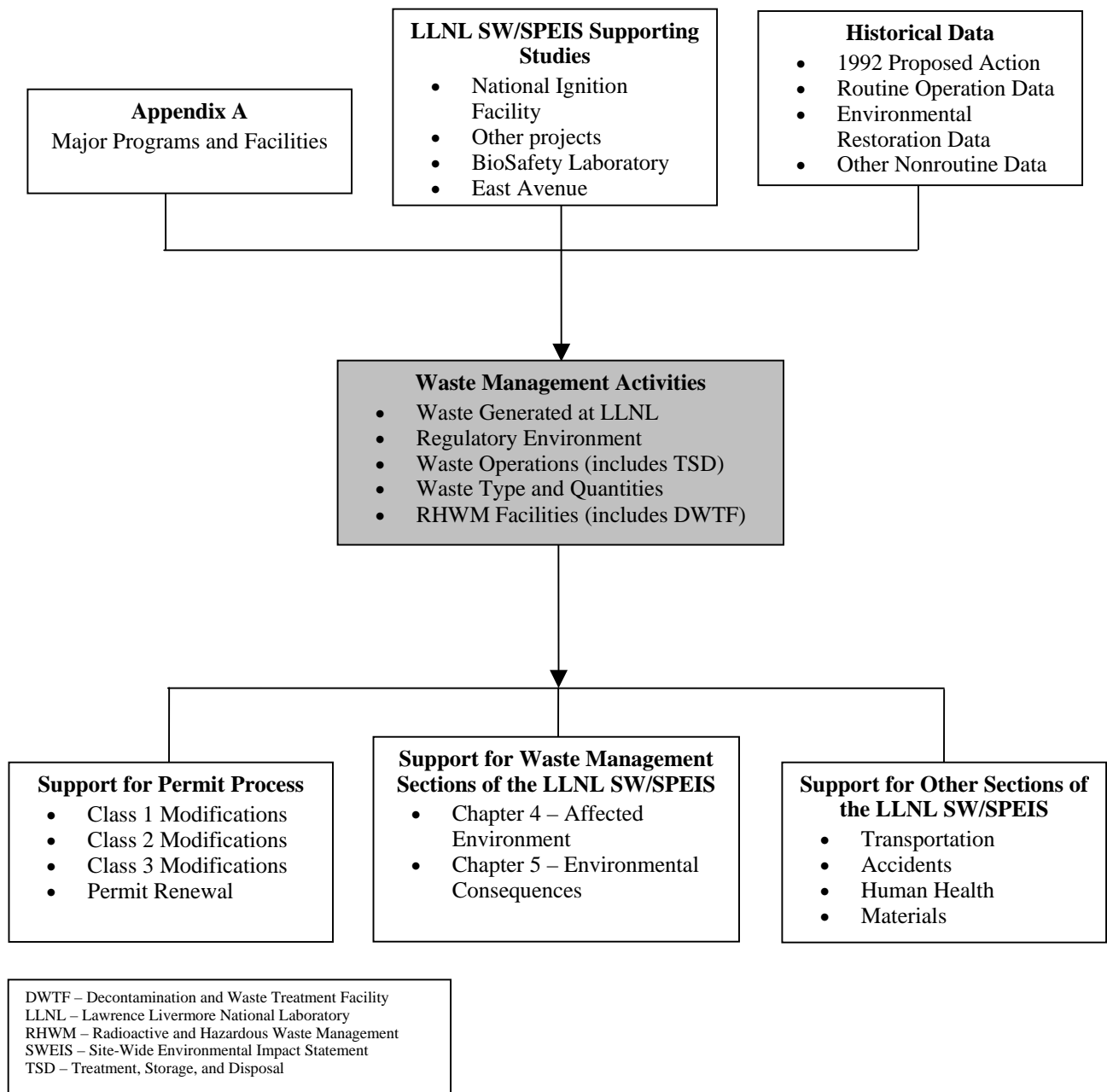
B.1 INTRODUCTION

Wastes at LLNL are routinely generated from the ongoing programmatic operations and infrastructure support activities described in Volume I of this LLNL SW/SPEIS. Wastes are also generated from special, limited duration projects. This section describes the types of wastes historically generated and managed at LLNL, the steps in the waste generation and management process, the current and proposed facilities in which waste management operations are conducted, and the waste treatment processes used.

B.1.1 Types of Waste Generated and Managed at the Livermore Site and Site 300

LLNL generates and manages both routine and nonroutine wastes. Routine wastes are those generated during the normal operation of laboratories, test facilities, and research and development (R&D) operations. Special, limited-duration projects, such as construction, that generate nonroutine wastes are considered separately from facility operations. These types of projects can make a large contribution to the overall waste generation at LLNL and are difficult to reasonably forecast on an annual basis. Three types of projects are considered special operations: construction, decontamination and decommissioning (D&D), and environmental restoration.

The types of wastes generated and managed at the Livermore Site and at Site 300 include low-level waste (LLW), mixed low-level waste (MLLW), transuranic (TRU) waste, mixed TRU waste, hazardous waste, construction waste, sanitary solid waste, industrial wastewater (nonsewerable), and sanitary wastewater. Descriptions of these waste types are shown in Table B.1.1–1. Table B.1.1–2 lists typical wastes accumulated in a generator area or managed in one of the waste management facilities. Detailed descriptions of actual waste streams, of which there are over 100, are listed in the RCRA permits.



Source: Original.

FIGURE B-1.—Conceptual Illustration of Appendix B

TABLE B.1.1–1.—Types of Waste Generated and Managed at the Livermore Site and Site 300

Low-Level Waste (LLW)—Waste that contains radioactivity and is not classified as high-level waste, transuranic waste, spent nuclear fuel, or by product tailings containing uranium or thorium from processed ore (as defined in Section 11[e][2] of the *Atomic Energy Act* [42 U.S.C. §2011 et seq.]). Test specimens of fissionable material, irradiated for research and development only and not for the production of power or plutonium, may be classified as LLW, if the concentration of transuranic waste is less than 100 nanocuries per gram.

Mixed Low-Level Waste (MLLW)—Waste that contains both hazardous waste regulated under the RCRA and LLW.

Transuranic (TRU) Waste—TRU waste is waste containing more than 100 nanocuries of alpha-emitting TRU isotopes per gram of waste, with a half-life greater than 20 years, except for (a) high-level radioactive waste; (b) waste that the Secretary of the U.S. Department of Energy (DOE) has determined, with concurrence of the Administrator of the U.S. Environmental Protection Agency (EPA), does not need the degree of isolation required by the disposal regulations; or (c) waste that the Nuclear Regulatory Commission (NRC) has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.

Mixed Transuranic (Mixed TRU) Waste—TRU waste that contains both hazardous waste regulated under the RCRA and TRU waste.

RCRA Hazardous Waste—Any solid waste (definition includes semisolid, liquid, or gaseous material) listed in Subpart D of 40 CFR Part 261 or having the characteristics of ignitability, corrosivity, toxicity, or reactivity, defined by RCRA.

State-Regulated Waste—Waste regulated by the State of California under Title 22 of the *California Code of Regulations*.

Biohazardous Waste—Waste that is capable of transmitting an infectious agent to a living organism. This includes discarded materials, biological agents (or fragments), biotoxins, (or fragments), and contaminated equipment.

Hazardous Waste—Waste includes RCRA hazardous waste, state-regulated waste, explosive wastes, and TSCA waste.

Explosive Waste—Waste that is RCRA hazardous waste such as waste explosives, waste containing waste explosive materials, and explosive-contaminated debris.

Environmental Restoration Waste—Waste generated while investigating, installing, monitoring, sampling, replacing equipment, restoring, or implementing required tasks as approved by regulatory agency agreements, plans, or other routine operations. Typical wastes include water, soil, pumps, tubing, filters, personal protective equipment, sampling equipment and chemicals, and other items.

Toxic Substances Control Act Waste—Waste that contains materials exceeding identified limits in the Act. LLNL generates and manages two TSCA-regulated wastes: polychlorinated biphenyls (PCBs) and asbestos.

Sanitary Solid Waste—Waste includes office and laboratory trash.

Other Waste—LLNL generates construction waste, demolition and decommissioning waste, and wastewater.

Legacy Waste—For this document, the term legacy waste includes TRU, mixed TRU, LLW, and MLLW and is considered to be these wastes currently in storage pending disposal. This is conservative because some of the waste is ready for shipment.

TABLE B.1.1–2.—Typical Waste Types Stored in Waste Accumulation Areas

Waste Types	
Acids (liquid)	Mixed radioactive waste (liquid/solid)
Asbestos	Oils (liquid/solid)
Combustible liquids	Oxidizers (liquid/solid)
Compressed gases	Paints (liquid/solid)
Flammable liquids	PCB waste (liquid/solid)
Halogenated and nonhalogenated solvents	Photochemicals (liquid)
Lab packs	Poisons
Laboratory debris (solid)	Radioactive waste (liquid/solid)
Mercury and mercury-contaminated waste	Reactive materials
Miscellaneous chemical waste and contaminated debris	Wastewaters (liquid)

Source: LLNL 2001aq.

PCB = polychlorinated biphenyl.

B.1.2 Waste Management at Lawrence Livermore National Laboratory

LLNL uses trained personnel and approved program procedures to control waste from the point of generation through storage, treatment, and disposal. LLNL waste management procedures cover identifying, generating, handling, packaging, storing, treating, and transporting all wastes including radioactive, hazardous, mixed, and medical wastes. The generators are primarily responsible for proper waste management in generator areas and receive assistance from several organizations including the LLNL RHWL Division, Environmental Protection Department, Plant Engineering Department, and other staffs. In this appendix, the term RHWL often refers to all activities or facilities at LLNL that manage radioactive and hazardous waste, regardless of organization. Accordingly, waste management facilities managed by the Plant Engineering Department and the Chemical and Materials Science Directorate are included in the term RHWL.

LLNL maintains control of hazardous, radioactive, and mixed wastes that are potentially harmful to human health and/or the environment. This control occurs through four types of waste management areas that can be used to accumulate such wastes:

- At the point of generation (i.e., at a Satellite Accumulation Area [SAA])
- At a Waste Accumulation Area (WAA)
- In a hazardous waste retention tank with a 90-day waste accumulation time limit
- At an interim status or permitted storage and/or treatment unit at LLNL

Specific conditions that govern the accumulation of wastes at each of these areas are described below.

An SAA is an area at LLNL where small quantities of hazardous, radioactive, and mixed wastes are temporarily accumulated at or near the initial point of generation without a California DTSC RCRA permit. Each SAA and the accumulation of waste at that SAA are under the direct control of the individual generating the waste (the term individual includes organization or department, for which a specific point of contact is assigned the lead). These waste generators control the waste container at all times. Hazardous and mixed wastes accumulated at an SAA are transferred

to other waste management facilities or shipped offsite before either accumulation time limits or quantity limits are reached. Also, waste containers that have been filled are transferred from the SAA or shipped offsite, as appropriate.

A WAA is an officially designated area at LLNL where hazardous, radioactive, and mixed wastes generated by an organization are accumulated in containers. Before a 90-day time limit expires, hazardous and mixed waste is transported to an approved RCRA-permitted Treatment, Storage, and Disposal Facility (TSDF), either onsite or offsite. A WAA serves an important role in the life cycle of waste management in that it provides temporary waste accumulation, without requiring a permit, after hazardous or mixed wastes reach SAA time or quantity limits. The number of WAAs in service at any time varies with programmatic need. In 2001, there were 22 WAAs in service at the Livermore Site and one in service at Site 300.

Routinely, wastes managed in SAAs and WAAs are transported to LLNL waste management facilities or directly to offsite waste management facilities. Waste management facilities currently in operation at LLNL and facilities that are in the process of being closed are discussed below.

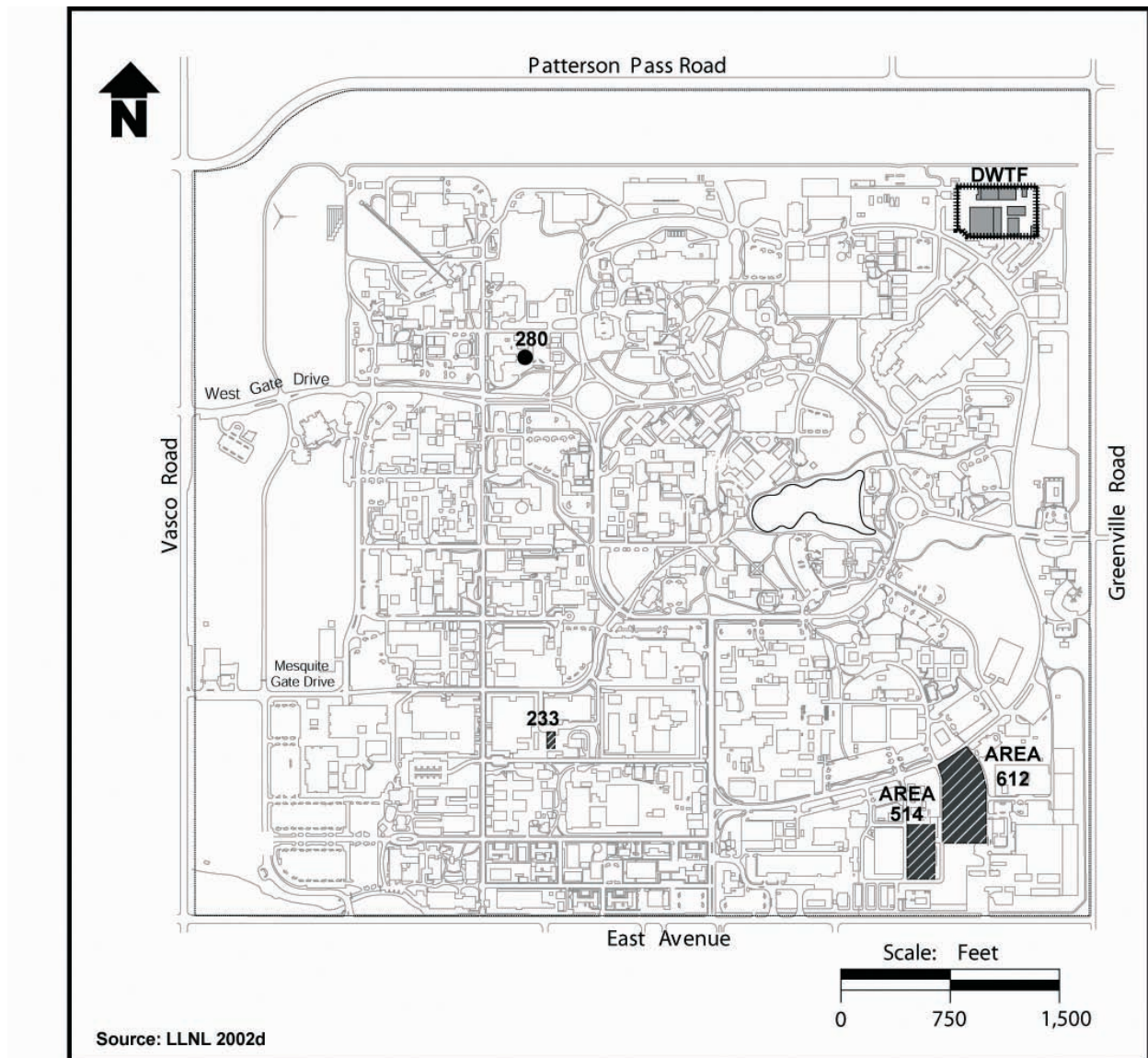
B.1.3 Waste Management Facilities at the Livermore Site

Treatment, storage and other waste management operations have been conducted historically in Building 233, Areas 514 and 612, and Building 693, at the Livermore Site (see Figure B.1.3–1). In 1996, construction of a new, consolidated waste treatment facility, the DWTF began in the northwest corner of the Livermore Site (see Figure B.1.3–1). An assessment of the environmental impacts associated with the DWTF construction and operation can be found in the *Environmental Assessment for the Decontamination and Waste Treatment Facility*, DOE/EA-1150 (LLNL 1996c) and the *Health Risk Assessment for Hazardous and Mixed Waste Management Units at the Lawrence Livermore National Laboratory* (LLNL 1997q). The DWTF construction has been completed and currently consists of Buildings 6951, 693, 694, 695, 696, and 697 and associated yard areas. The DWTF replaces waste management operations in Area 514 and Building 233 and consolidates other waste management activities into one facility. After relocation of waste operations from Area 514 and Building 233 to DWTF is complete, Area 514 and Building 233 will be closed. Waste management operations in Area 612 will continue.

Wastes stored in the Building 233 container storage unit (CSU) were removed in January 2002, and the facility is no longer active. Waste operations in Area 514 are currently being relocated to DWTF. In accordance with RCRA requirements, Area 514 and Building 233 will undergo RCRA closure. Final closure plans were submitted to DTSC in May 2000.

Although Building 419 has historically been used for waste management operations, it has undergone closure and is being maintained in a mothballed state. The State of California has not taken any action to approve the closure. Building 419 will not be mentioned again in this appendix. Another Livermore Site facility, Building 280, is permitted for hazardous and mixed waste storage, but storage operations have not and will not commence. As such, Building 280 will undergo administrative closure using the permit modification process.

The treatment and storage capacities associated with individual units of the various RHWM facilities are indicated in Table B.1.3–1.



Source: LLNL 2002e.

FIGURE B.1.3–1.—Waste Management Facilities at the Livermore Site

TABLE B.1.3–1.—Lawrence Livermore National Laboratory Active Waste Management Facilities and Capacity

Facility	Unit Type	Waste Type	RCRA, HWCA Wastes – Permit Capacity Totals
Area 612 Facility			
Building 625 CSU	S	H, M, R, TSCA, CT	42,416 gal
Area 612 Tank Trailer Storage Unit	S	CT, H, M, R	5,000 gal
Area 612 Portable Tank Storage Unit	S	CT, H, M, R	10,000 gal
Area 612-1 CSU	S	CT, H, M, R	38,400 ft ³
Area 612-2 CSU	S	CT, H, M, R	10,560 gal
Area 612-5 CSU	S	CT, H, M, R	26,900 ft ³
Building 612 Size Reduction Unit	T	CT, H, M, R	250 short tons/yr
Building 612 Drum/Container Crushing Unit	T	CT, H, M, R	600 short tons/yr
Building 612 CSU	S	CT, H, M, R	7,150 gal
Building 614 West Cells CSU	S	CT, H, M, R	168 gal/cell (4 cells)
Building 614 East Cells CSU	S	CT, H, M, R	880 gal/cell (4 cells)
DWTF			
Building 693 CSU	S	CT, H, M, R	141,240 gal
Building 693 Annex	S	CT, H, M, R	3,060 ft ³
Building 693 Yard—Freezer Storage Unit	S	CT, H, M, R	30 gal
Building 693 Yard—Roll-Off Bin Storage Unit	S	CT, H	2,160 ft ³
Building 695 Airlock	S	H, M	12,000 gal
Building 695 LWPA Waste Blending Station, Tank Blending Unit	T	CT, H, M, R	Part of 695 Tank Farm capacity
Building 695 LWPA Waste Blending Station, Portable Blending Unit	T	CT, H, M, R	Part of 695 Tank Farm capacity
Building 695 LWPA Cold Vapor Evaporation Unit	T	CT, H, M, R	Part of 695 Tank Farm capacity
Building 695 LWPA Centrifuge Unit	T	CT, H, M, R	55,000 gal/yr
Building 695 LWPA Solidification Unit	T	CT, H, M, R	115 short tons/yr
Building 695 LWPA Shredding Unit	T	CT, H, M, R	183 short tons/yr
Building 695 LWPA Filtration Unit	T	CT, H, M, R	2,750 gal/yr

TABLE B.1.3–1.—LLNL Active Waste Management Facilities and Capacity (continued)

Facility	Unit Type	Waste Type	RCRA, HWCA Wastes – Permit Capacity Totals
DWTF (continued)			
Building 695 LWPA Drum Rinsing Unit, Bulking Station	T	CT, H, M, R	180 short tons/yr
Building 695 LWPA Debris Washer Unit	T	CT, H, M, R	45 short tons/yr
Building 695 LWPA Gas Absorption Unit	T	CT, H, M, R	0.09 short tons/day
Building 695 LWPA Radwaste Evaporator	T (non-RCRA)	R	
Building 695 LWPA Air Lock	(non-RCRA)	R	
Building 695 RWPA/SSTL Water Reactor	T	CT, H, M, R	0.09 short tons/day
Building 695 RWPA/SSTL Pressure Reactor	T	CT, H, M, R	0.09 short tons/day
Building 695 RWPA/SSTL Amalgamation Reactor	T	CT, H, M, R	0.09 short tons/day
Building 695 RWPA/SSTL Uranium Bleaching Unit	T	CT, H, M, R	0.09 short tons/day
Small Scale Treatment Laboratory	T	H, M, R	0.04 short tons/day
Reactive Waste Storage Room	S	CT, H, M, R	12,400 gal
Building 695 Tank Farm	S, T	CT, H, M, R	45,000 gal (storage), 325,000 gal/yr (treatment)
DWTF Portable Tank Storage Pad	S	CT, H, M, R	22,000 gal
Building 696 Radioactive Waste Storage Area	S	R (only)	N/A. A plan to obtain RCRA permit status would allow for 33,000-gal storage capacity. Currently the storage space manages up to 600 55-gal radioactive waste drums
Building 696 Solid Waste Process Area	N/A	Nonhazardous Nonradioactive Wastes	N/A
Area 514^b			
Area 514-1 CSU/Treatment Unit Group	S, T	R, M, TSCA	N/A ^d
Area 514-2 CSU	S	R, M, TSCA	N/A ^d
Area 514-3 CSU	S	H, R, M, TSCA	N/A ^d
Area 514 Waste Water Treatment Tank Farm Unit	S, T		N/A ^d
Building 513 CSU	S, T	H, M, R	N/A ^d
EWTF- Site 300			
Open Burn Unit -Pan	T	H ^d	150 lb/event
Open Burn Unit -Cage	T	H ^d	260 lb/event
Open Detonation Unit	T	H ^d	350 lb/event
Storage Unit S1	S	H ^d	275 gal
Storage Unit S2	S	H ^d	110 gal

TABLE B.1.3–1.—LLNL Active Waste Management Facilities and Capacity (continued)

Facility	Unit Type	Waste Type	RCRA, HWCA Wastes – Permit Capacity Totals
EWSF-Site 300 (continued)			
Magazine 1	S	H ^c	1,622 lb (net explosive weight)
Magazine 2	S	H ^c	3,209 lb (net explosive weight)
Magazine 3	S	H ^c	5,592 lb (net explosive weight)
Magazine 4	S	H ^c	4,291 lb (net explosive weight)
Magazine 5	S	H ^c	2,744 lb (net explosive weight)
Magazine 816	S	H ^c	168 55-gallon drums (no liquids)
Building 883-Site 300			
Building 883 CSU	S	H	3,300 gal

^aTypically an operational limit including a combination of Hazardous, Radioactive, and Mixed Waste unless otherwise restricted by Permit or LLNL management practice.

^bUnder several alternatives, all or some of this facility would undergo RCRA Closure and operational capabilities would be transferred to the DWTF.

^cExplosives and explosive contaminated wastes.

^dArea 514 capacity is included in Building 695 Part B permit.

CSU = Container Storage Unit; CT = A non-RCRA hazardous waste defined by State of California per Title 22 California Code of Regulations; DWTF = Decontamination and Waste Treatment Facility; EWTF = Explosive Waste Storage Facility; gal = gallon; H = Hazardous; lb = pound; HWCA = *Hazardous Waste Control Act*; LWPA = liquid waste processing area; M = Mixed; N/A = not applicable; R = Radioactive (may include LLW and TRU); RHWM = Radioactive and Hazardous Waste Management; RWPA = reactive waste processing area; S = Storage; SSTL = Small Scale Treatment Laboratory; T = Treatment; TSCA = *Toxic Substances Control Act*; yd³ = cubic yard.

Note: Many of the facilities listed in this table manage solid waste (waste that does not require a permit and is not radioactive). While the list above is comprehensive it does not include all work areas within a facility where waste is staged, loaded on and off vehicles, inspected, etc. For this information please refer to documents referenced in this appendix.

B.1.3.1 *Area 612 Complex*

Area 612 is divided into two segments, the Building 612 Segment and the Building 625 Segment, based on location and management needs. Each segment contains a number of storage or treatment units. The structures and areas within the Building 612 Segment are:

- Area 612 Portable Tank Storage Unit
- Area 612-1 CSU
- Area 612-2 CSU
- Area 612-5 CSU
- Building 612 Consolidation Waste Accumulation Area
- Building 612 Drum/Container Crushing Unit
- Building 612 Size Reduction Unit
- Building 612 CSU
- Building 614 East Cells CSU
- Building 614 West Cells CSU
- Building 612 Segment Yard Areas

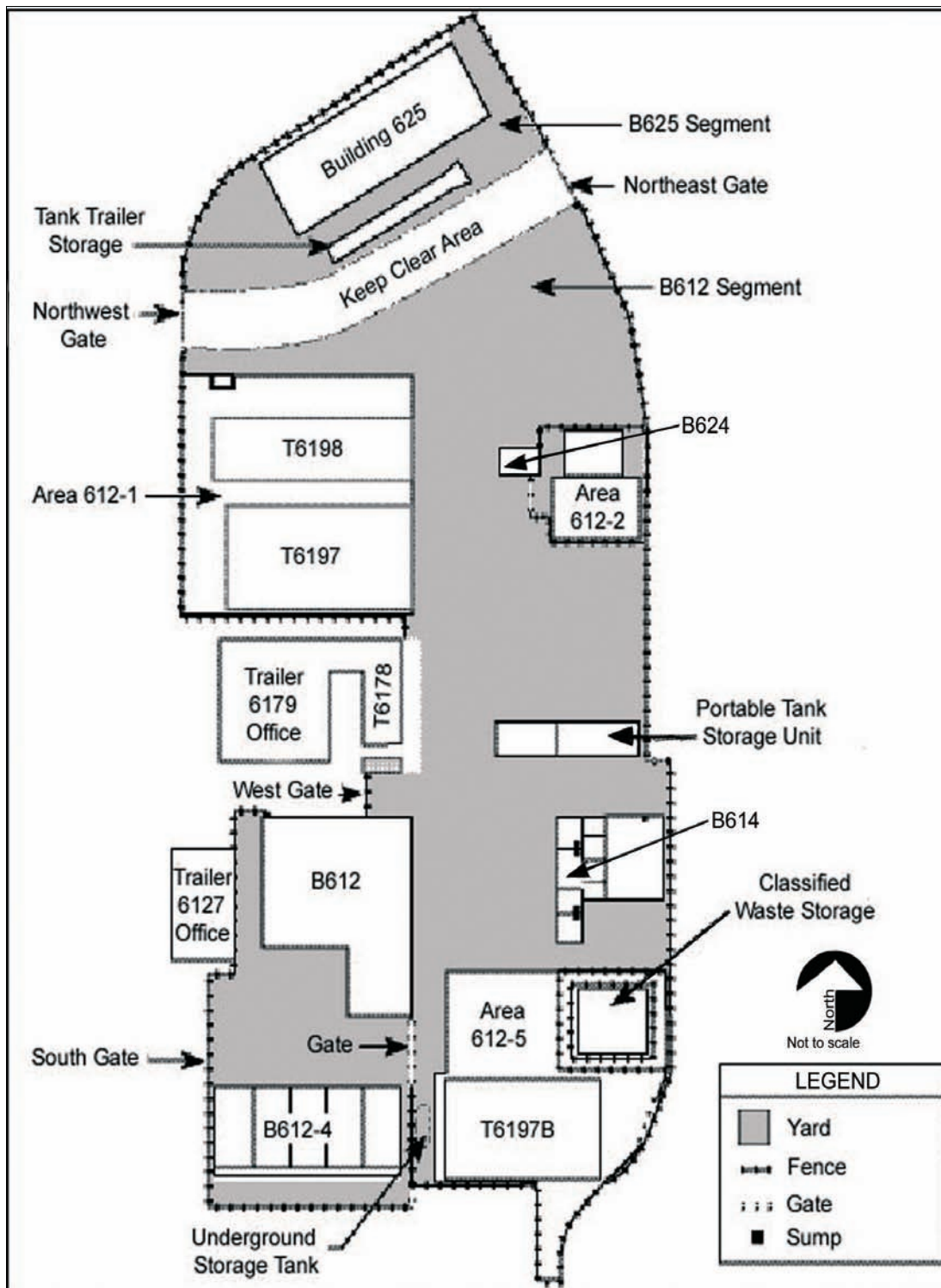
The structures and areas within the Building 625 Segment are:

- Building 625 CSU
- Area 612 Tank Trailer Storage Unit
- Building 625 Segment Yard Areas

Area 612 segments and yard areas are shown in Figure B.1.3.1–1. Detailed descriptions of the Area 612 segments are presented below.

Building 612

Building 612 houses the drum crusher for hazardous or radioactive drums and containers, a radioactivity-measuring unit, the CSU that supports the lab packing of small quantities of nonradioactive waste chemicals, and the bulking of corrosive materials, and a mixed waste storage area. The capacities are identified in Table B.1.3–1. The drum crusher is connected to a high-efficiency particulate air (HEPA) filter to remove any airborne particulate contaminants.



Source: LLNL 2000t.

FIGURE B.1.3.1-1.—Area 612 Complex

A small room adjacent to the lab packing area is used for bulking corrosive materials (i.e., mixing smaller quantities together to form larger quantities) and for sorting chemicals prior to taking the materials into the lab packing area.

The mixed waste storage area in Building 612 has a total inventory capacity of 7,150 gallons or approximately 130 55-gallon drums of waste. Hazardous and mixed wastes stored in this building are stored on pallets.

Storage Areas 612-1 and 612-5

Storage Area 612-1 consists of two enclosed tents constructed of plastic-coated canvas. Tent A is 49 feet by 82 feet, while Tent B is 30 feet by 98 feet. The total capacity for Tent A and B is approximately 38,400 cubic feet of solid waste. Storage Area 612-5 consists of a fenced area and a tent made of plastic-coated canvas. The fenced area contains four 8-foot by 8-foot by 40-foot containers used to store classified solid mixed wastes. The tent is 49 × 98 feet with storage capacity of 26,900 cubic feet.

A staging area is available in the yard area where wastes are loaded on and off vehicles, inspected, prepared, and transferred.

Storage Area 612-2

Storage Area 612-2 is a 30-foot by 47-foot, covered area used for storage of hazardous and mixed waste with a capacity of 10,560 gallons, surrounded by a 6-inch-high concrete berm. Liquid wastes are stored in the area in 55-gallon drums or smaller containers (generally 5 gallons or less) that are placed on secondary containment pallets. Liquid waste can also be stored in portable tanks, with capacities of 300, 600, 660, 750, and 1,100 gallons. These tanks are typically not placed on secondary containment pallets unless segregation of incompatible wastes is required.

Storage Area 612-4

Storage Area 612-4 is the primary receipt, segregation, and storage area (less than 90 days) for most wastes generated at LLNL prior to their distribution to the appropriate treatment, storage, process, or disposal site. The 40-foot by 100-foot area is covered by a roof and has an epoxy-coated concrete floor that is subdivided into five areas by berms that provide secondary containment. Three of the areas can store the equivalent of 144 55-gallon drums each and the other two can store the equivalent of 216 55-gallon drums each, totaling 864 55-gallon drums.

Building 614

Building 614 is divided into eight rooms or cells for storage of hazardous wastes and bulking of small quantities of compatible materials. The types of waste handled and stored in these cells may vary depending on need. Only compatible wastes, however, are managed in any single room at one time. Wastes stored in these cells include, but are not limited to, the following:

- Waste mercury
- Oxidizers

- Flammables
- Alkali and earth alkali solids
- Chlorosolvents and oils
- Caustics
- Acids
- Compressed gases
- Radioactive and mixed waste
- Aqueous solutions containing precious metals

The four cells on the west side of the building each have a maximum storage capacity of 168 gallons of waste. The four cells on the east side of the building each have a maximum storage capacity of 880 gallons of waste. In addition to storage, the east cells may also be used for bulking and lab-packing small quantities of compatible materials.

Building 625

This building handles and stores TRU and mixed TRU wastes and wastes regulated under the *Toxic Substances Control Act* (TSCA), such as polychlorinated biphenyls and asbestos. The building has a total floorspace of approximately 4,800 square feet and may store 42,416 gallons of waste volume. An epoxy-coated concrete berm inside the building separates the radioactive wastes (east side) from the nonradioactive wastes (west side) and provides a secondary containment capacity of about 17,954 gallons. Wastes are typically stored in steel drums or steel boxes.

Area 612 Portable Tank Storage Unit

The Area 612 Portable Tank Storage Unit is used to store liquid wastes in portable tanks. The storage unit has a design capacity of 10,000 gallons and is divided into two cells by a concrete curb. Cell A is designed to store up to 4,000 gallons of hazardous waste while Cell B has a design capacity of 6,000 gallons. The area consists of an uncovered 1,200-square-foot concrete pad surrounded on the north, east, and west sides by a concrete curb. The concrete pad slopes northward 11 inches high over 16 feet and the curb heights range from 11 inches along the north side to 0 inches along the southern edge of the storage area.

The internal dimensions of Cell A are 30 feet by 16 feet, and the internal dimensions of Cell B are 45 feet by 16 feet. Cell A is designed for storage of portable tanks as large as 330 gallons, while Cell B can store tanks as large as 660 gallons. The south end of the storage unit provides personnel and equipment access for managing, inspecting, and maintaining the containers.

Area 612 Tank Trailer Storage Areas

The Area 612 Tank Trailer Storage Area is designated for storage of hazardous or mixed liquid wastes in tank trailers or in portable tanks on flatbed trailers. The area has a total storage capacity

of 5,000 gallons and the largest volume of any individual container that can be stored in the area is 5,000 gallons. The storage area is an uncovered recessed loading dock. The unit is 9 feet wide and 77.5 feet long and is recessed down to 4 feet below grade with a ramp on the east end for access. More than one tank trailer or flatbed trailer with portable tanks may be stored in the area as long as the wastes are compatible (i.e., will not create an additional hazard if mixed).

B.1.3.2 *Decontamination and Waste Treatment Facility*

The DWTF is a hazardous, radioactive, and mixed waste treatment and storage facility located in the northeast corner of the Livermore Site. Figure B.1.3.2–1 provides a footprint of the DWTF and identifies the facility segments. Hazardous and mixed waste management activities involve five individual facilities: Buildings 693, 694, 695, 696, and 697, and associated yard areas. Building 693 is a container storage unit and activities include waste packaging and storage. Building 695 provides storage and waste treatment capabilities including bulking and blending of wastes into treatment tanks; treating liquid and solid hazardous, mixed, and low-level radioactive wastes; storing; container rinsing; and waste transfer. Building 694 is the operational support facility and Building 697 is a Chemical Exchange Warehouse used for chemical exchange operations. Building 696 provides radioactive waste storage and solid waste receiving and processing capabilities. Building 695 includes a maintenance shop. Areas within the DWTF yard include a rainwater management area, a tanker storage area, a covered truck bay, and truck scales. Yard areas are used by mobile vendors to certify TRU waste and load it for shipment to WIPP.

As with Area 612, the DWTF is divided into three segments, based on location and management needs, for the purpose of safety analysis. Each segment contains a number of storage or treatment units. The segments within the DWTF are:

- Building 693 Segment
- Building 695 Segment
- Building 696R Segment

Detailed descriptions of the structures and areas within the DWTF segments are presented below.

Building 693 Segment

The Building 693 Segment consists of the following structures and areas:

- Building 693
- Building 693 Annex CSU
- Building 693 Freezer Storage Unit
- Building 693 Roll-off Bin Storage Unit
- DWTF Portable Tank Storage Unit
- DWTF Underground Storage Tank
- Building 693 Segment Yard Areas

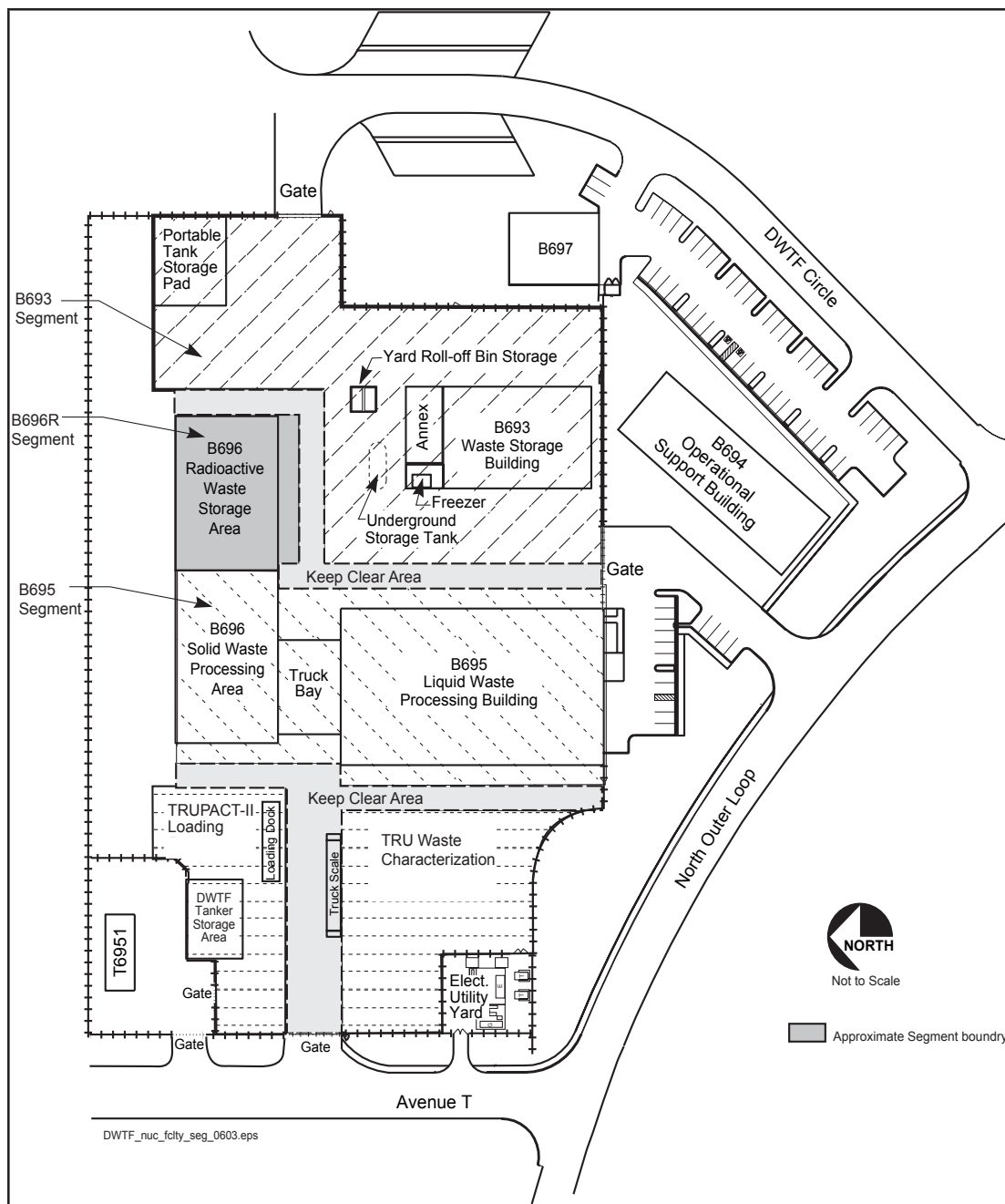


FIGURE B.1.3.2–1.—Decontamination and Waste Treatment Facility

Building 693 is a single-story, rigid structural steel frame building that is 80 feet wide and 120 feet long. The building interior is divided into four cells where wastes are segregated according to compatibility. The cells are approximately 30 by 80 feet and are separated by fire rated partitions. The two end cells (1000 and 1012) are designed to store 21,117 gallons each of hazardous and mixed waste. The center cells (1004 and 1008) are designed to store 21,118 gallons each of hazardous and mixed waste. The foundation floor slab consists of 10-inch-thick, reinforced concrete slab. The curbing system which surrounds the floor slab and divides the four cells is continuous, seamless, 8 inches wide, 6 inches high, and constructed of reinforced concrete. The concrete floor is finished with fiberglass-reinforced epoxy coating to ensure containment and cleanup of any leaks or spills. This unit stores solid, liquid, and gaseous wastes.

The Building 693 CSU is used to store RCRA and DTSC regulated hazardous and mixed wastes as well as TSCA regulated waste and TRU waste. The unit stores solid, liquid, and gaseous wastes. Other handling operations conducted in this unit include lab packing, over packing, bulking, sampling, and transferring. Ignitable, reactive, toxic, and corrosive wastes are grouped by compatibility and segregated appropriately in each of the four cells in Building 693.

As part of the construction of DWTF, the Building 693 Annex was added to the north end of Building 693. The Annex was designed for waste storage as well as providing a pad for the Building 693 Freezer Storage Unit. In addition to its planned use for waste storage, the Building 693 Annex will be used to thermally stabilize TRU waste in preparation for head space gas sampling, one of the processes required to certify the waste for shipment to the Waste Isolation Pilot Plant (WIPP) for disposal.

The Building 693 Roll-off Bin Storage Unit, DWTF Portable Tank Storage Unit and DWTF Underground Storage Tank are located in the Building 693 Segment Yard Area north of the building. The Building 693 Roll-off Bin Storage Unit is a concrete pad on which up to two vendor supplied large metal bins (roll off bins) are stored while collecting RCRA hazardous and non-RCRA hazardous solid waste. The DWTF Portable Tank Storage Unit is a coated, bermed, concrete pad designed to hold portable tanks of liquid waste. The liquid waste could be low-level, hazardous or mixed waste. These liquids primarily contain water. The DWTF Underground Storage Tank is connected by underground pipes to several DWTF facilities, including the Building 693 Annex, to capture overflow water from sprinklers in case of a fire.

Building 695 Segment

The Building 695 segment consists of the following structures and areas:

- Building 695
- Building 696S Solid Waste Processing Area (SWPA)
- Tanker Storage Area
- Other Yard Areas

Building 695 is used to manage both solid and liquid wastes, some of which are regulated under RCRA. The building is approximately 123 feet wide by 213 feet long. Building 695 is used to store and treat radioactive, mixed, and hazardous waste, and it also contains equipment used in conjunction with waste processing operations to treat various liquid and solid wastes. Waste

management areas within Building 695 have sloping, epoxy-line concrete floors that provide secondary containment in the case of spills.

Building 695 is divided into the following areas:

- The liquid waste processing area (LWPA) is a high bay that houses various unit operations, such as the Tank Farm for storing and treating wastewater, evaporators, wastewater filtration module, bulking station, carbon adsorption unit, centrifuge, and waste blending station. The wastewater treatment tank farm consists of nine 5,000-gallon treatment tanks, and associated, valves, pumps and controls. The purpose of the tank farm is to treat wastewater that may be contaminated with hazardous constituents and/or radioactive isotopes. The LWPA also houses primary Process Off-Gas Systems that consists of air filtration equipment for treating offgases from waste treatment operations. This equipment includes carbon filters; acid gas scrubbers; volatile organic compound scrubbers; HEPA filters; and other associated air-handling equipment.
- The Building 695 airlock is used for transferring and storing containers, and it may house various portable treatment units when space permits.
- Processing rooms east of the Building 695 airlock house the shredder/chopper, solidification unit, and debris washer.
- The reactive materials area includes the reactive waste processing area (RWPA), four reactive waste storage rooms used for segregated storage of reactive wastes (e.g., water-reactive materials), and the reactive materials cell. The RWPA includes acid fume hoods and the combination, inert, and radioisotope gloveboxes. This area may also include units such as the mercury amalgamation unit, small laboratory operation hardware, and pressure reaction vessel. The reactive materials cell is a general-purpose area used for operations such as repackaging, uranium deactivation, and other bench scale processes.
- The small-scale treatment lab is operated in a manner similar to the reactive-materials area and may include units such as the mercury amalgamation unit, small laboratory operation hardware, and pressure reaction vessel.
- The instrument laboratory houses various analytical instruments, such as a gas-chromatograph/mass spectrometer, x-ray fluorescence spectrometer, and a dry electrolytic conductivity detector, and is used for real-time radiological and almost real-time metals and volatile organic carbon analyses to aid in treating mixed and radioactive wastes and developing improved treatment processes.
- The Building 695 Mezzanine contains air-handling units, water heater, communications equipment, and some power distribution (e.g., those items normally found in industrial complexes). The north section of the mezzanine contains HEPA filters for particulate removal from building air and process vents. The main building stack is located on the mezzanine in the northeast corner of the building.
- Building 695 Lobby, Office Space, Locker Rooms, and Utility Rooms.

Equipment was selected specifically to treat the waste streams RHWMM expects will be generated at LLNL. However, some wastes might have unique characteristics that preclude treatment by

existing equipment and shipment to an offsite treatment, storage, and disposal facility. Because unique wastes are generated infrequently, installing dedicated equipment is neither practical nor cost effective. Bench-scale, tabletop treatment processes can be developed on a case-by-case basis and conducted in one or more of the reactive materials area work stations.

The SWPA, located at the west end of Building 696, is a one-story, structural steel frame building measuring approximately 83 feet by 135 feet by 35 feet high. The building's exterior walls are metal panels on steel girts with a sloped, corrugated metal roof. The SWPA includes the waste receiving/classification room, solid waste processing room, a room that houses the Building 696S glovebox, and an airlock. The drum crushers are located in Room 1009, the Building 696S glovebox is located in Room 1008, and a fume hood is provided for waste management operations, e.g., lab-packing, in Room 1001. A 5-ton industrial bridge crane is located in both Rooms 1009 and 1001. The SWPA also houses primary air handling and HEPA filtration equipment for treating offgases from waste treatment operations. Building air and air from treatment operations is routed from Building 696S to the main building HEPA filters in Building 695 before passing out the Building 695 stack. The SWPA is used primarily to manage solid radioactive waste. Operations specific to the SWPA include sorting and segregating LLW and TRU waste, lab-packing, sampling, and crushing empty drums that previously contained LLW. The Building 696 SWPA may be used to store hazardous and mixed waste for up to 90 days in compliance with RCRA.

The west yard area includes a covered truck bay located directly between the west end of Building 696S and the north end of Building 695. The truck bay is used to receive incoming vehicles delivering waste containers. The truck bay is a 12-inch-thick concrete slab that has a polymeric coating and measures approximately 80 feet long by 50 feet wide. The pad is sloped towards a central trench. The truck bay is covered with a roof that prevents direct precipitation, and run-on is prevented because the adjacent asphalt drive slopes away from the containment area. To the west of Building 696S is a truck scale and a ramped loading dock used for loading and unloading vendor supplies and some waste transport vehicles. The area on the southwest side of Building 695 includes chemical reagent storage tanks, and a small metal storage shed.

The DWTF tanker storage area is a sloped pad to the west of Building 696S that provides secondary containment. This consists of an outdoor concrete sloping slab with concrete curbing and a collection trench along the north side of the pad. It is used to store tankers containing dilute concentrations of radioactive and hazardous materials, e.g., rainwater. The most common storage containers are tankers that have nominal volumes of 5,000 to 7,000 gallons. The containment pad is capable of holding approximately 18,000 gallons. This area also has a direct connection to the sanitary sewer for releases of liquids that meet sewer discharge limits.

Other nonwaste management areas in the Building 695 Segment include:

- **T6951 Maintenance Area**— This area is for routine maintenance of facility equipment. This building and yard areas are separated from the rest of the DWTF facility by fences, and gates. It contains only small amounts of solvents and lubricants for maintenance purposes, compressed gas cylinders, and fueled vehicles, and does not contain radionuclides.
- **DWTF Transformer Area**— This yard area contains the DWTF emergency generator and transformer. This area is separated from the nuclear facility by fences. It contains only fuel for the generator and does not contain radionuclides.

Building 696R Segment

The Building 696R segment consists of Building 696R and other yard areas.

Building 696R is a single-story, rigid, structural steel frame building approximately 83 feet wide by 120 feet long. The building is divided into two rooms. The foundation floor slab consists of 10-inch-thick, reinforced-concrete slab that slopes to the north of the building. The concrete floor is finished with fiberglass-reinforced epoxy coating to ensure containment and cleanup of any leaks or spills. Building 696R is not connected to the Building 695 ventilation system and has only passive ventilation.

Building 696R is designed for the storage of solid TRU waste, solid and liquid low-level waste, and combined waste (i.e., radioactive and California-regulated hazardous waste). The Building 696R Segment is not currently permitted. Therefore, hazardous and mixed waste will not be allowed in this area until the permit is obtained. However, TRU waste or LLW contaminated with California-only regulated hazardous constituents (that is, combined waste) may be stored in Building 696R. Operations in the Building 696R segment include loading, unloading, staging, storage, over packing, LLW sampling, and periodic visual inspections of waste containers.

TRU Waste Segments

The mission performed in the TRU Waste Segments is to characterize LLNL TRU waste, repackage it as necessary, and load the waste drums into Transuranic Package Transporter–II (TRUPAC-II) casks for offsite shipment. The waste needs to meet both the U.S. Department of Transportation (DOT) shipping requirements and the waste acceptance criteria for the receiving facility, which will be the WIPP.

B.1.4 Descriptions of Radioactive and Hazardous Waste Management Facilities at Site 300

Because Site 300 is part of the LLNL operations, the waste management procedures are similar for identifying, handling, packaging, storing, and transporting radioactive, hazardous, mixed, and medical wastes. The onsite generators have the same responsibilities as those at the Livermore Site and also receive the same assistance from the LLNL waste management staff. Wastes generated at the buildings are accumulated in SAAs and then transported to the Site 300 waste management facilities. Hazardous wastes are stored at the Building 883 Container Storage Area, and low-level radioactive wastes are staged and stored at Buildings 804 and 883 WAAs. Site 300 also stores high explosive wastes at the Explosive Waste Storage Facility (EWSF) and treats high explosives waste at the Explosive Waste Treatment Facility (EWTF) (Building 845). The following sections describe these operations: the generation, collection, and storage of radioactive, mixed, and hazardous waste. Treatment and storage capacities are presented in Table B.1.3–1.

Explosive Waste Treatment Facility

The EWTF, located in Building 845, was built to replace the Building 829 High Explosives Open Burn Treatment Facility (RCRA closure was completed in 1999). The EWTF consists of two open burn units (burn pan and burn cage) and one open detonation unit (gravel pad). After treatment, residual wastes are managed in two storage units (S1 and S2) with a permitted storage capacity of 275 gallons and 110 gallons, respectively. In 2002, the EWTF treated 2,735 pounds

of explosive-related hazardous waste (LLNL 2003be). Treatment quantity limits are shown in Table B.1.4–1. Biological, radioactive, and mixed wastes are not permitted at the EWTF.

TABLE B.1.4–1.—Explosive Waste Treatment Facility Treatment and Quantity Limits

	Burn Pan	Burn Cage	Detonation Pad
Annual limit	100 open burns/yr	100 open burns/yr	100/yr
Daily limit	1 open burn/day	1 open burn/day	1/day
Gross weight limit	150 lb/event	260 lb/event	350 lb/event

Source: California EPA 1997.
lb = pounds; yr = year.

Explosive Waste Storage Facility

The EWSF consists of three earth-covered, concrete magazines; two earth-covered, corrugated-metal magazines; and one prefabricated metal building. The magazines are built in a semicircle in a knoll with their doors facing out from the knoll. The materials and methods of construction are designed to minimize sympathetic fires and explosions by maintaining a fairly consistent temperature and humidity within each structure. Compliance with explosive weight and distance limits also helps to ensure the safe operation of the EWSF.

Building 883—Hazardous Waste Storage Facility

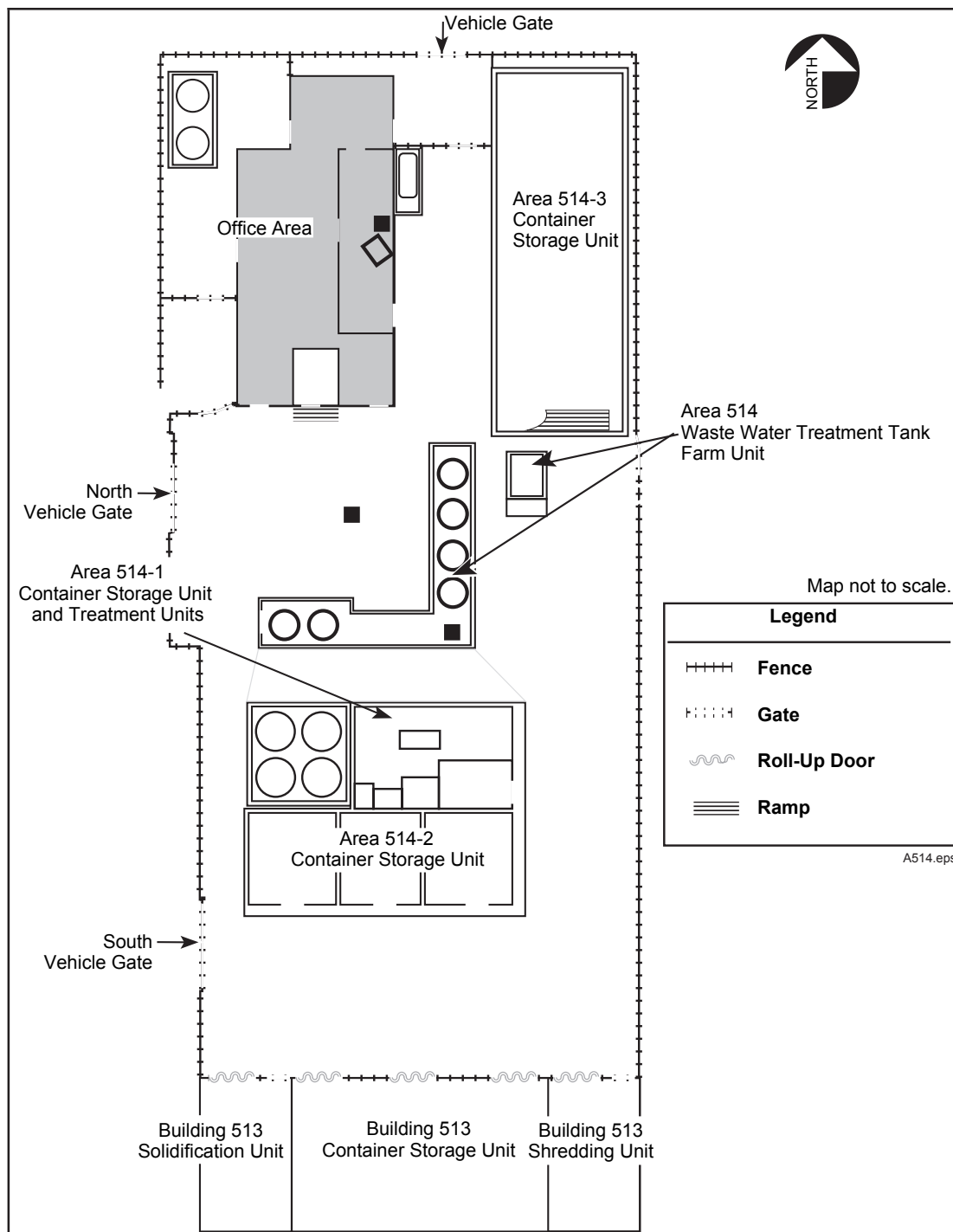
Building 883, the Hazardous Waste Storage Facility, consists of a roofed, rectangular structure 50 feet by 35 feet with a total inventory capacity of 3,300 gallons consisting of sixty 55-gallon drums or their equivalent. The facility is a RCRA Part B-permitted facility for storage of designated hazardous wastes. The floor area is surrounded by a berm for secondary containment and slopes to a sump in the southwest corner of the building. The facility is not used for the storage of radioactive wastes. Building 883 WAA can stage and stove low-level wastes before shipment to offsite disposal facilities. Building 804, a metal roof shed, is used for long term storage of gravel potentially contaminated with low-level radioactive materials.

B.1.5 Waste Management Facilities to be Shut Down and Closed

Three facilities at LLNL that are approved for waste management operations have been or will be shut down and closed. The Building 233 CSU has been shut down and all wastes removed. Building 280, although permitted for storage of hazardous waste, was never operated. Prior to FY2005, Building 514 operations will be transferred to the DWTF. Final closure plans for Building 233 and Area 514 were submitted to DTSC in May 2000. Since Area 514 will continue operations in the near term, descriptions of the waste management units in Area 514 are presented below. Treatment and storage capacities are presented in Table B.1.3–1.

Building 513

Building 513 houses a size reduction treatment unit (designed to operate with hand tools) and a radioactive and mixed waste container storage area. A solidification unit that was previously located in Building 513 has been relocated to Building 695 as part of the transition plan. This unit processes up to 8.32 cubic yards per day. Figure B.1.5–1 provides a footprint of Area 514. Area 514 is operated as a radiological facility.



Source: LLNL 2002ce.

FIGURE B.1.5–1.—Area 514 Complex

The storage area has a total storage capacity of 15,760 gallons, or approximately 286 55-gallon drums of regulated waste. Incompatible wastes (i.e., wastes that cause a potential hazard if mixed) have been stored on secondary containment pallets to contain leaks or spills.

Building 514

This building houses the wastewater filtration unit. As water is processed through the rotating drum vacuum filter, solids are filtered out by the diatomaceous earth, built up on the outside of the rotating drum, and continuously scraped off as the drum rotates during operation. The scraped material is collected for storage as a mixed waste. If the filtrate meets release limits, it is discharged to the sanitary sewer. If it does not meet the release criteria, the filtrate is reprocessed until the release limits are met.

Building 514 Wastewater Treatment Tank Farm and Storage Tanks

The wastewater treatment tank farm consists of six 1,850-gallon treatment tanks, and a quadruple tank unit (4-4,600 gallon storage tanks). The purpose of the tank farm is to treat wastewater that may be contaminated with hazardous constituents and/or radioactive isotopes. The purpose of the quadruple tank unit is to store, transfer, pump, bulk, and sample wastewater.

For the treatment tanks, the majority of liquid wastes arrive at the Building 514 Complex in portable tanks and are pumped into the 1,850-gallon tanks through a pump station. Wastes in containers such as 55-gallon drums and 5-gallon carboys are consolidated and transferred to the 1,850-gallon tanks via the bulking station. The treatment process may involve batch chemical treatments consisting of neutralization, flocculation, oxidation, reduction, precipitation, and separation. Filtration is accomplished by a diatomaceous earth-precoated vacuum filter located in Building 514.

For the quadruple tank unit, the tanks are filled through a pump station and can be pumped to any of the treatment tanks. The wastewater is stored until such time as treatment can be effectively performed. No treatment operations are performed in the quadruple tanks.

Storage Areas 514-1 and 514-2

These areas are designated for the storage and treatment of mixed wastes. They consist of epoxy-coated, covered concrete storage pads with sloped floors contained by 12-inch-high berms on three sides. Storage Area 514-1 contains a cold vapor evaporator. The cold vapor evaporator, which is used to remove greater than 85 percent of the water from a waste stream, will be removed from the facility in fiscal year (FY) 2004.

Storage Area 514-2 is subdivided into three areas by concrete berms in order to separate incompatible chemicals. The types of mixed waste stored in these areas include radioactive acid and alkaline solutions, dilute coolant with oil residue, and wastes containing low concentrations of metals including copper, beryllium, chromium, nickel, and/or zinc. Waste containers are stored on pallets.

Storage Area 514-3

This area is used as a portable tank and container storage area to store waste prior to treatment at the wastewater treatment tank farm. The types of waste stored in these areas include acid and

alkaline solutions, dilute coolant with oil residue, and wastes containing low concentrations of metals including copper, beryllium, chromium, nickel, and/or zinc. The majority of these wastes contain radioactive constituents and are consequently treated as mixed wastes. The area is also used to store solid waste generated by the wastewater filtration unit as well as empty tanks. The total storage capacity for the area is 22,050 gallons or approximately 400 55-gallon drums.

B.2 PURPOSE AND NEED

The NNSA needs to enhance the efficiency and safety of its current waste operations. NNSA proposes to meet its need by preparing a series of permit modifications, phasing out older facilities, and increasing operations to the design capabilities of the DWTF. The DWTF would continue to consolidate current waste operations, provide a facility to conduct hazardous operations, provide for the treatment and processing of stored wastes, improve waste minimization, and fully implement facility capabilities for waste treatment, storage, and processing. This centralized facility would concentrate like activities in one area, thus providing safer and more efficient working conditions. Other facilities (Area 612 Complex and Site 300 RHWL Facilities) would continue to treat, store, and process waste in support of LLNL programs and missions.

The proposed modifications are evaluated in this LLNL SW/SPEIS because of the integral nature of the radioactive and hazardous waste management operations to the overall LLNL mission. This appendix serves as the NEPA documentation for these modifications. One purpose of this appendix is to provide the NNSA decisionmaker, the DTSC, and the public with permit modification-specific information in one report, even though the impact analysis also appears under the individual environmental resources and issue areas of this LLNL SW/SPEIS.

B.3 DESCRIPTIONS OF THE NO ACTION ALTERNATIVE, PROPOSED ACTION, AND REDUCED OPERATION ALTERNATIVE FOR WASTE MANAGEMENT

CEQ regulations (40 CFR Parts 1500-1508) require that DOE and other Federal agencies use the review process established by NEPA, as amended (42 U.S.C. §4321 et seq.), and the DOE regulations implementing NEPA (10 CFR Part 1021) to evaluate not only the Proposed Action, but also to identify and review reasonable alternatives to the Proposed Action, as well as a No Action Alternative. This comprehensive review ensures that environmental information is available to public officials and citizens before decisions are made and before actions are taken.

NNSA developed the No Action Alternative, Proposed Action, and Reduced Operation Alternative to accomplish this action and to assess environmental impacts of waste management activities at LLNL. This appendix examines and compares the No Action Alternative, Proposed Action, and Reduced Operation Alternative. LLNL activity descriptions, by facility, are also provided. All of the activities discussed in this appendix were used in evaluating the impacts of each alternative presented in Chapter 3 of the LLNL SW/SPEIS. The alternatives are defined in the following sections:

- No Action Alternative (Section B.3.1)
- Proposed Action (Section B.3.2)
- Reduced Operation Alternative (Section B.3.3)